DTM64328D

4GB - 240-Pin 2Rx8 Registered ECC DDR3 DIMM

Identification

DTM64328D 512Mx72

4GB 2Rx8 PC3-10600R-9-11-B0

Performance range

Clock / Module Speed / CL-t_{RCD} -t_{RP}

667 MHz / PC3-10600 / 9-9-9

533 MHz / PC3-8500 / 8-8-8

533 MHz / PC3-8500 / 7-7-7

400 MHz / PC3-6400 / 6-6-6

Features

- 240-pin JEDEC-compliant DIMM, 133.35 mm wide by 30 mm high
- Operating Voltage: 1.5V ± 0.075
- I/O Type: SSTL_15
- On-board I2C temperature sensor with integrated serial presence-detect (SPD) EEPROM
- Data Transfer Rate: 10.6 Gigabytes/sec
- Data Bursts: 8 and burst chop 4 mode
- ZQ Calibration for Output Driver and On-Die Termination (ODT)
- Programmable ODT / Dynamic ODT during Writes
- Programmable CAS Latency: 6, 7, 8 and 9
- Bi-Directional Differential Data Strobe signals
- SDRAM Addressing (Row/Col/Bank): 15/10/3
- Fully RoHS Compliant

Description

DTM64328D is a registered 512Mx72 memory module, which conforms to JEDEC's DDR3, PC3-10600 standard. The assembly is Dual-Rank. Each Rank is comprised of nine 256Mx8 DDR3 Hynix SDRAMs. One 2K-bit EEPROM is used for Serial Presence Detect and a combination register/PLL, with Address and Command Parity, is also used.

Both output driver strength and input termination impedance are programmable to maintain signal integrity on the I/O signals in a Fly-by topology.

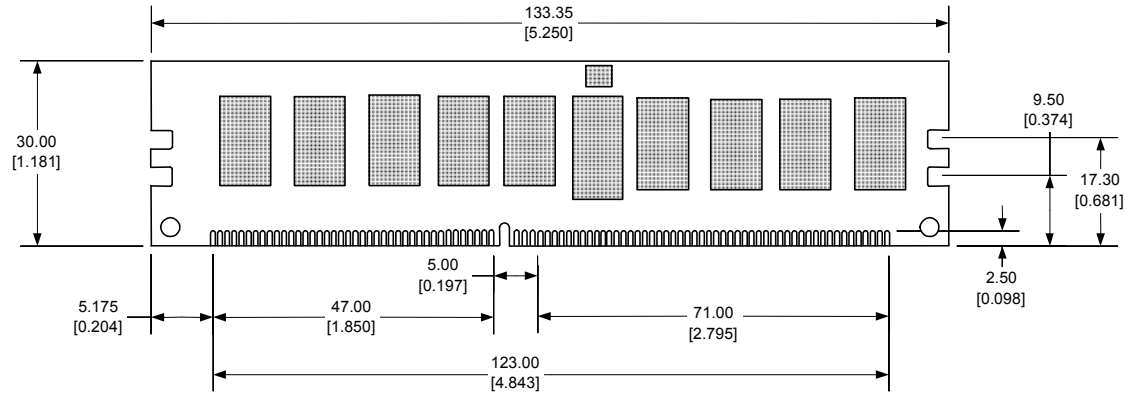
A thermal sensor accurately monitors the DIMM module and can prevent exceeding the maximum operating temperature of 95C.

Pin Configuration

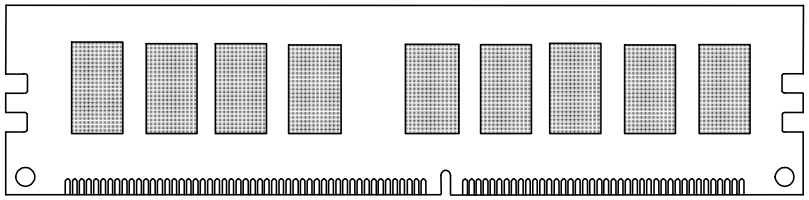
Front Side				Back Side				Pin Description	
1 V_{REFDQ}	31 DQ25	61 A2	91 DQ41	121 V_{SS}	151 V_{SS}	181 A1	211 V_{SS}	**Name**	**Function**
2 V_{SS}	32 V_{SS}	62 V_{DD}	92 V_{SS}	122 DQ4	152 DM3	182 V_{DD}	212 DM5	DQ[63:0]	Data Bits
3 DQ0	33 /DQS3	63 CK1*	93 /DQS5	123 DQ5	153 /TDQS12	183 V_{DD}	213 /TDQS14	DQS[8:0], /DQS[8:0]	Differential Data Strobes
4 DQ1	34 DQS3	64 /CK1*	94 DQS5	124 V_{SS}	154 V_{SS}	184 CK0	214 V_{SS}	DM[8:0]	Data Mask
5 V_{SS}	35 V_{SS}	65 V_{DD}	95 V_{SS}	125 DM0	155 DQ30	185 /CK0	215 DQ46	/TDQS[17:9]	Termination Data Strobe
6 /DQS0	36 DQ26	66 V_{DD}	96 DQ42	126 /TDQS9	156 DQ31	186 V_{DD}	216 DQ47	CK[1:0], /CK[1:0]	Differential Clock Inputs
7 DQS0	37 DQ27	67 V_{REFCA}	97 DQ43	127 V_{SS}	157 V_{SS}	187 /Event	217 V_{SS}	CKE[1:0]	Clock Enables
8 V_{SS}	38 V_{SS}	68 P_{AR_IN}	98 V_{SS}	128 DQ6	158 CB4	188 A0	218 DQ52	/CAS	Column Address Strobe
9 DQ2	39 CB0	69 VDD	99 DQ48	129 DQ7	159 CB5	189 V_{DD}	219 DQ53	/RAS	Row Address Strobe
10 DQ3	40 CB1	70 A10/AP	100 DQ49	130 V_{SS}	160 V_{SS}	190 BA1	220 V_{SS}	/S[3:0]	Chip Selects
11 V_{SS}	41 V_{SS}	71 BA0	101 V_{SS}	131 DQ12	161 DM8	191 V_{DD}	221 DM6	/WE	Write Enable
12 DQ8	42 /DQS8	72 V_{DD}	102 /DQS6	132 DQ13	162 /TDQS17	192 /RAS	222 /TDQS15	A[15:0]	Address Inputs
13 DQ9	43 DQS8	73 /WE	103 DQS6	133 V_{SS}	163 V_{SS}	193 /S0	223 V_{SS}	BA[2:0]	Bank Addresses
14 V_{SS}	44 V_{SS}	74 /CAS	104 V_{SS}	134 DM1	164 CB6	194 V_{DD}	224 DQ54	ODT[1:0]	On Die Termination Inputs
15 /DQS1	45 CB2	75 V_{DD}	105 DQ50	135 /TDQS10	165 CB7	195 ODT0	225 DQ55	SA[2:0]	SPD Address
16 DQS1	46 CB3	76 /S1	106 DQ51	136 V_{SS}	166 V_{SS}	196 A13	226 V_{SS}	SCL	SPD Clock Input
17 V_{SS}	47 V_{SS}	77 ODT1	107 V_{SS}	137 DQ14	167 NC (TEST)	197 V_{DD}	227 DQ60	SDA	SPD Data Input/Output
18 DQ10	48 V_{TT}	78 V_{DD}	108 DQ56	138 DQ15	168 /RESET	198 /S3, NC*	228 DQ61	/EVENT	Temperature Sensing
19 DQ11	49 V_{TT}	79 /S2, NC*	109 DQ57	139 V_{SS}	169 CKE1	199 V_{SS}	229 V_{SS}	/RESET	Reset for register and DRAMs
20 V_{SS}	50 CKE0	80 V_{SS}	110 V_{SS}	140 DQ20	170 V_{DD}	200 DQ36	230 DM7	PAR_IN	Parity bit for Addr/Ctrl
21 DQ16	51 V_{DD}	81 DQ32	111 /DQS7	141 DQ21	171 A15	201 DQ37	231 /TDQS16	/ERR_OUT	Error bit for Parity Error
22 DQ17	52 BA2	82 DQ33	112 DQS7	142 V_{SS}	172 A14	202 V_{SS}	232 V_{SS}	A12/BC	Combination input: Addr12/Burst Chop
23 V_{SS}	53 /E_{RR_OUT}	83 V_{SS}	113 V_{SS}	143 DM2	173 V_{DD}	203 DM4	233 DQ62	A10/AP	Combination input: Addr10/Auto-precharge
24 /DQS2	54 V_{DD}	84 /DQS4	114 DQ58	144 /TDQS11	174 A12/BC	204 /TDQS13	234 DQ63	V_{SS}	Ground
25 DQS2	55 A11	85 DQS4	115 DQ59	145 V_{SS}	175 A9	205 V_{SS}	235 V_{SS}	V_{DD}	Power
26 V_{SS}	56 A7	86 V_{SS}	116 V_{SS}	146 DQ22	176 V_{DD}	206 DQ38	236 V_{DDSPD}	V_{DDSPD}	SPD EEPROM Power
27 DQ18	57 V_{DD}	87 DQ34	117 SA0	147 DQ23	177 A8	207 DQ39	237 SA1	V_{REFDQ}	Reference Voltage for DQ's
28 DQ19	58 A5	88 DQ35	118 SCL	148 V_{SS}	178 A6	208 V_{SS}	238 SDA	V_{REFCA}	Reference Voltage for CA
29 V_{SS}	59 A4	89 V_{SS}	119 SA2	149 DQ28	179 V_{DD}	209 DQ44	239 V_{SS}	V_{TT}	Termination Voltage
30 DQ24	60 V_{DD}	90 DQ40	120 V_T	150 DQ29	180 A3	210 DQ45	240 V_{TT}	NC	No Connection

* = Not used

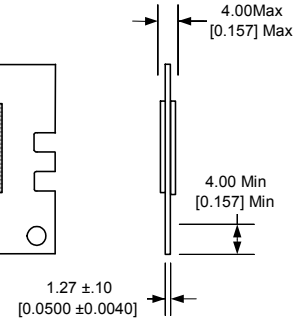
Front view



Back view



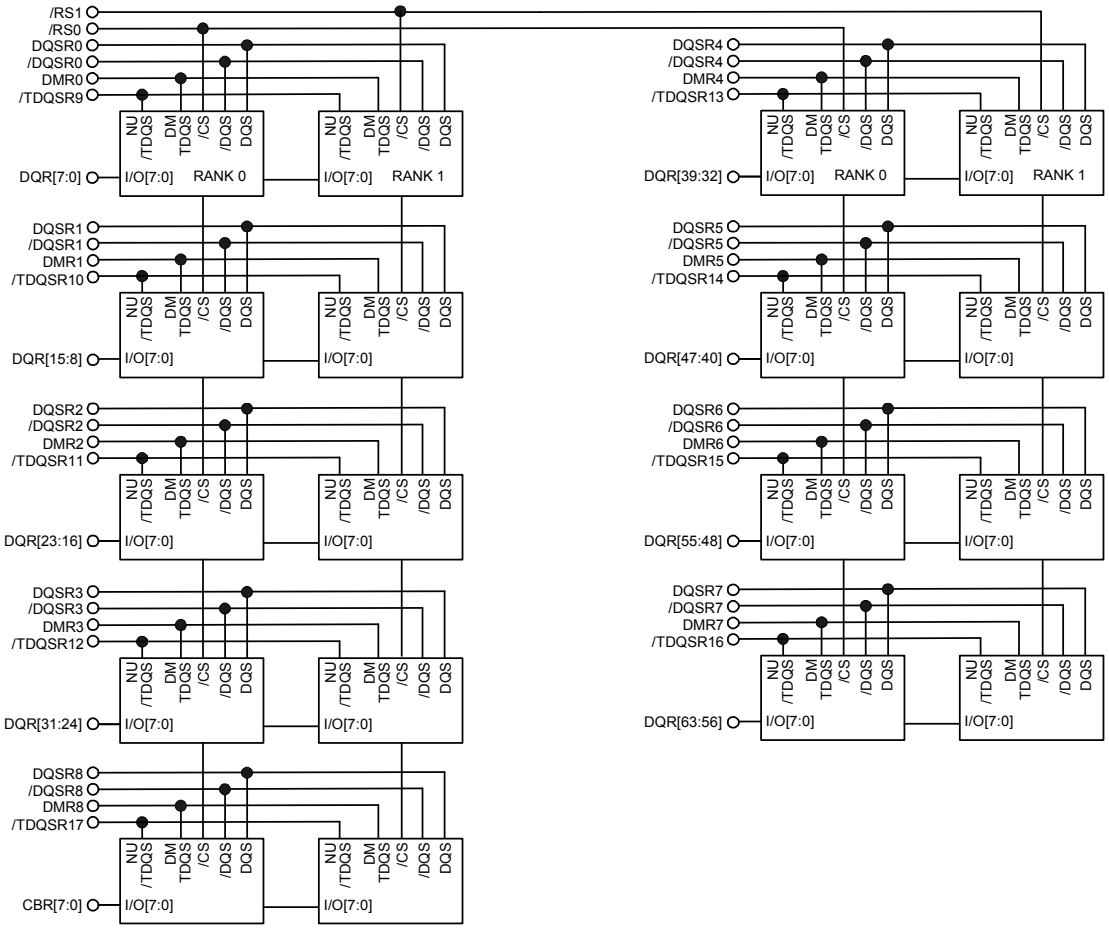
Side view

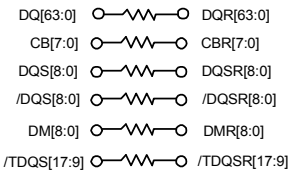


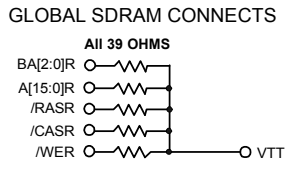
Notes

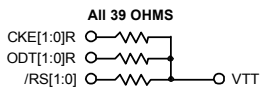
Tolerances on all dimensions except where otherwise indicated are ±.13 (.005).

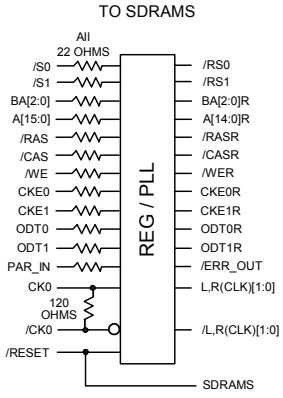
All dimensions are expressed: millimeters [inches]

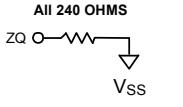

/RS1
/RS0
DQSR0
/DQSR0
DMR0
/TDQSR9
DQR[7:0]
RANK 0
RANK 1
DQSR1
/DQSR1
DMR1
/TDQSR10
DQR[15:8]
DQSR2
/DQSR2
DMR2
/TDQSR11
DQR[23:16]
DQSR3
/DQSR3
DMR3
/TDQSR12
DQR[31:24]
DQSR8
/DQSR8
DMR8
/TDQSR17
CBR[7:0]
DQSR4
/DQSR4
DMR4
/TDQSR13
DQR[39:32]
DQSR5
/DQSR5
DMR5
/TDQSR14
DQR[47:40]
DQSR6
/DQSR6
DMR6
/TDQSR15
DQR[55:48]
DQSR7
/DQSR7
DMR7
/TDQSR16
DQR[63:56]
NU /TDQS
DM TDQS
/CS
/DQS
DQS
I/O[7:0]

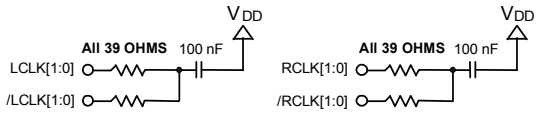

All 15 OHMS
DQ[63:0]
DQR[63:0]
CB[7:0]
CBR[7:0]
DQS[8:0]
DQSR[8:0]
/DQS[8:0]
/DQSR[8:0]
DM[8:0]
DMR[8:0]
/TDQS[17:9]
/TDQSR[17:9]

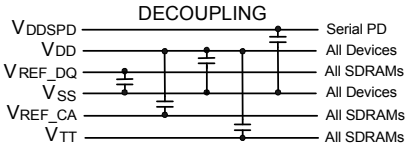

GLOBAL SDRAM CONNECTS
All 39 OHMS
BA[2:0]R
A[15:0]R
/RASR
/CASR
/WER
VTT

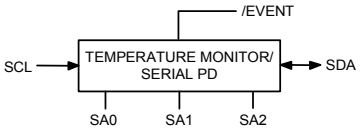

All 39 OHMS
CKE[1:0]R
ODT[1:0]R
/RS[1:0]
VTT


TO SDRAMS
All
22 OHMS
/S0
/S1
BA[2:0]
A[15:0]
/RAS
/CAS
/WE
CKE0
CKE1
ODT0
ODT1
PAR_IN
CK0
120
OHMS
/CK0
/RESET
REG / PLL
/RS0
/RS1
BA[2:0]R
A[14:0]R
/RASR
/CASR
/WER
CKE0R
CKE1R
ODT0R
ODT1R
/ERR_OUT
L,R(CLK)[1:0]
/L,R(CLK)[1:0]
SDRAMS


All 240 OHMS
ZQ
VSS


VDD
All 39 OHMS
100 nF
LCLK[1:0]
/LCLK[1:0]
VDD
All 39 OHMS
100 nF
RCLK[1:0]
/RCLK[1:0]


DECOUPLING
VDDSPD
VDD
VREF_DQ
VSS
VREF_CA
VTT
Serial PD
All Devices
All SDRAMs
All Devices
All SDRAMs
All SDRAMs


/EVENT
SCL
TEMPERATURE MONITOR/
SERIAL PD
SDA
SA0
SA1
SA2

Absolute Maximum Ratings
(Note: Operation at or above Absolute Maximum Ratings can adversely affect module reliability.)

PARAMETER	Symbol	Minimum	Maximum	Unit
Temperature, non-Operating	$T_{STORAGE}$	-55	100	C
Ambient Temperature, Operating	T_A	0	70	C
DRAM Case Temperature, Operating	T_{CASE}	0	95	C
Voltage on V_{DD} relative to V_{SS}	V_{DD}	-0.4	1.975	V
Voltage on Any Pin relative to V_{SS}	V_{IN},V_{OUT}	-0.4	1.975	V

Notes:
DRAM Operating Case Temperature above 85C requires 2X refresh.

Recommended DC Operating Conditions (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Minimum	Typical	Maximum	Unit	Note
Power Supply Voltage	V_{DD}	1.425	1.5	1.575	V	
I/O Reference Voltage	V_{REFDQ}	0.49 V_{DD}	0.50 V_{DD}	0.51 V_{DD}	V	1
I/O Reference Voltage	V_{REFCA}	0.49 V_{DD}	0.50 V_{DD}	0.51 V_{DD}	V	1

Notes:
1) The value of V_{REF} is expected to equal one-half V_{DD} and to track variations in the V_{DD} DC level. Peak-to-peak noise on V_{REF} may not exceed ±1% of its DC value. For Reference V_{DD}/2 ± 15 mV.

DC Input Logic Levels, Single-Ended (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Minimum	Maximum	Unit
Logical High (Logic 1)	$V_{IH(DC)}$	V_{REF} + 0.1	V_{DD}	V
Logical Low (Logic 0)	$V_{IL(DC)}$	V_{SS}	V_{REF} - 0.1	V

AC Input Logic Levels, Single-Ended (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Minimum	Maximum	Unit
Logical High (Logic 1)	$V_{IH(AC)}$	V_{REF} + 0.175	-	V
Logical Low (Logic 0)	$V_{IL(AC)}$	-	V_{REF} - 0.175	V

Differential Input Logic Levels (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Minimum	Maximum	Unit
Differential Input Logic High	$V_{IH.DIFF}$	+0.200	DC:V_{DD} AC:V_{DD}+0.4	V
Differential Input Logic Low	$V_{IL.DIFF}$	DC:V_{SS} AC:V_{SS}-0.4	-0.200	V
Differential Input Cross Point Voltage relative to VDD/2	V_{IX}	- 0.150	+ 0.150	V

Capacitance (T_A = 25 C, f = 100 MHz)

PARAMETER	Pin	Symbol	Minimum	Maximum	Unit
Input Capacitance, Clock	CK0, /CK0	C_{CK}	1.5	2.5	pF
Input Capacitance, Address	BA[2:0], A[15:0], /RAS, /CAS, /WE	C_I	1.5	2.5	pF
Input Capacitance Control	/S[1:0], CKE[1:0], ODT[1:0]	C_I	1.5	2.5	
Input/Output Capacitance	DQ[63:0], CB[7:0] DQS[8:0], /DQS[8:0], DM[8:0], /TDQS[17:9]	C_{IO}	3	5	pF

DC Characteristics (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Minimum	Maximum	Unit	Note
Input Leakage Current (Any input 0 V < VIN < VDD)	I_{IL}	-18	+18	µA	1,2
Output Leakage Current (0V < VOUT < VDDQ)	I_{OL}	-10	+10	µA	2,3

Notes:
1) All other pins not under test = 0 V
2) Values are shown per pin
3) DQ, DQS, DQS and ODT are disabled

I_{DD} Specifications and Conditions (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Test Condition	Max Value	Unit
Operating One Bank Active-Precharge Current	$I_{DD}0$*	Operating current : One bank ACTIVATE-to-PRECHARGE	468	mA
Operating One Bank Active-Read-Precharge Current	$I_{DD}1$*	Operating current : One bank ACTIVATE-to-READ-to-PRECHARGE	558	mA
Precharge Power-Down Current	$I_{DD}2P$**	Precharge power down current: (Slow exit)	216	mA
Precharge Power-Down Current	$I_{DD}2P$**	Precharge power down current: (Fast exit)	270	mA
Precharge Quiet Standby Current	$I_{DD}2Q$**	Precharge quiet standby current	414	mA
Precharge Standby Current	$I_{DD}2N$**	Precharge standby current	450	mA
Active Power-Down Current	$I_{DD}3P$**	Active power-down current	270	mA
Active Standby Current	$I_{DD}3N$**	Active standby current	486	mA
Operating Burst Write Current	$I_{DD}4W$*	Burst write operating current	873	mA
Operating Burst Read Current	$I_{DD}4R$*	Burst read operating current	918	mA
Burst Refresh Current	$I_{DD}5$**	Refresh current	2070	mA
Self Refresh Current	$I_{DD}6$**	Self-refresh temperature current: MAX Tc = 85°C	216	mA
Operating Bank Interleave Read Current	$I_{DD}7$*	All bank interleaved read current	3240	mA

* One module rank in this operation the rest in IDD2P slow exit.
** All module ranks in this operation.

AC Operating Conditions

PARAMETER	Symbol	Min	Max	Unit
Internal read command to first data	t_{AA}	13.125	20	ns
CAS-to-CAS Command Delay	t_{CCD}	4	-	t_{CK}
Clock High Level Width	$t_{CH(avg)}$	0.47	0.53	t_{CK}
Clock Cycle Time	t_{CK}	1.5	1.875	ns
Clock Low Level Width	$t_{CL(avg)}$	0.47	0.53	t_{CK}
Data Input Hold Time after DQS Strobe	t_{DH}	65	-	ps
DQ Input Pulse Width	t_{DIPW}	400	-	ps
DQS Output Access Time from Clock	t_{DQSCK}	-255	+255	ps
Write DQS High Level Width	t_{DQSH}	0.45	0.55	$t_{CK(avg)}$
Write DQS Low Level Width	t_{DQSL}	0.45	0.55	$t_{CK(avg)}$
DQS-Out Edge to Data-Out Edge Skew	t_{DQSQ}	-	125	ps
Data Input Setup Time Before DQS Strobe	t_{DS}	30	-	ps
DQS Falling Edge from Clock, Hold Time	t_{DSH}	0.2	-	$t_{CK(avg)}$
DQS Falling Edge to Clock, Setup Time	t_{DSS}	0.2	-	$t_{CK(avg)}$
Clock Half Period	t_{HP}	minimum of t_{CH} or t_{CL}	-	ns
Address and Command Hold Time after Clock	t_{IH}	140	-	ps
Address and Command Setup Time before Clock	t_{IS}	65	-	ps
Load Mode Command Cycle Time	t_{MRD}	4	-	t_{CK}
DQ-to-DQS Hold	t_{QH}	0.38	-	$t_{CK(avg)}$
Active-to-Precharge Time	t_{RAS}	36	$9*t_{REFI}$	ns
Active-to-Active / Auto Refresh Time	t_{RC}	49.125	-	ns
RAS-to-CAS Delay	t_{RCD}	13.125	-	ns
Average Periodic Refresh Interval 0^{o} C $\leq T_{CASE} < 85^{o}$ C	t_{REFI}	-	7.8	µs
Average Periodic Refresh Interval 0^{o} C $\leq T_{CASE} < 95^{o}$ C	t_{REFI}	-	3.9	µs
Auto Refresh Row Cycle Time	t_{RFC}	160	-	ns
Row Precharge Time	t_{RP}	13.125	-	ns
Read DQS Preamble Time	t_{RPRE}	0.9	Note-1	$t_{CK(avg)}$
Read DQS Postamble Time	t_{RPST}	0.3	Note-2	$t_{CK(avg)}$
Row Active to Row Active Delay	t_{RRD}	Max(4nCK, 6ns)	-	ns
Internal Read to Precharge Command Delay	t_{RTP}	Max(4nCK, 7.5ns)	-	ns
Write DQS Preamble Setup Time	t_{WPRE}	0.9	-	$t_{CK(avg)}$
Write DQS Postamble Time	t_{WPST}	0.3	-	$t_{CK(avg)}$
Write Recovery Time	t_{WR}	15	-	ns
Internal Write to Read Command Delay	t_{WTR}	Max(4nCK, 7.5ns)	-	ns

Notes:
1. The maximum preamble is bound by tLZDQS(min)
2. The maximum postamble is bound by tHZDQS(max)

SERIAL PRESENCE DETECT MATRIX

Byte#	Function.	Value	Hex
0	Number of Bytes Used / Number of Bytes in SPD Device / CRC Coverage.		0x92
	Bit 3 ~ Bit 0. SPD Bytes Used -	176	
	Bit 6 ~ Bit 4. SPD Bytes Total -	256	
	Bit 7. CRC Coverage -	Bytes 0-116	
1	SPD Revision.	Rev. 1.1	0x11
2	Key Byte / DRAM Device Type.	DDR3 SDRAM	0x0B
3	Key Byte / Module Type.		0x01
	Bit 3 ~ Bit 0. Module Type -	RDIMM	
	Bit 7 ~ Bit 4. Reserved -	0	
4	SDRAM Density and Banks.		0x02
	Bit 3 ~ Bit 0. Total SDRAM capacity, in megabits -	1Gb	
	Bit 6 ~ Bit 4. Bank Address Bits -	8 banks	
	Bit 7. Reserved -	0	
5	SDRAM Addressing.		0x19
	Bit 2 ~ Bit 0. Column Address Bits -	10	
	Bit 5 ~ Bit 3. Row Address Bits -	15	
	Bit 7, 6. Reserved	0	
6	Reserved.	UNUSED	0x00
7	Module Organization.		0x09
	Bit 2 ~ Bit 0. SDRAM Device Width -	8-Bits	
	Bit 5 ~ Bit 3. Number of Ranks -	2-Rank	
	Bit 7, 6. Reserved	0	
8	Module Memory Bus Width.		0x0B
	Bit 2 ~ Bit 0. Primary bus width, in bits -	64-Bits	
	Bit 4, Bit 3. Bus width extension, in bits -	8-Bits	
	Bit 7 ~ Bit 5. Reserved -	0	
9	Fine Timebase (FTB) Dividend / Divisor.		0x52
	Bit 3 ~ Bit 0. Fine Timebase (FTB) Divisor	2	
	Bit 7 ~ Bit 4. Fine Timebase (FTB) Dividend	5	
10	Medium Timebase (MTB) Dividend.	1 (MTB = 0.125ns)	0x01
11	Medium Timebase (MTB) Divisor.	8 (MTB = 0.125ns)	0x08
12	SDRAM Minimum Cycle Time (tCKmin).	1.5ns	0x0C
13	Reserved.	UNUSED	0x00
14	CAS Latencies Supported, Least Significant Byte.		0x3C
	Bit 0. CL = 4 -		
	Bit 1. CL = 5 -		
	Bit 2. CL = 6 -	X	
	Bit 3. CL = 7 -	X	
	Bit 4. CL = 8 -	X	
	Bit 5. CL = 9 -	X	
	Bit 6. CL = 10 -		
	Bit 7. CL = 11 -		

15	CAS Latencies Supported, Most Significant Byte.		0x00
	Bit 0. CL = 12 -		
	Bit 1. CL = 13 -		
	Bit 2. CL =14 -		
	Bit 3. CL = 15 -		
	Bit 4. CL = 16 -		
	Bit 5. CL = 17 -		
	Bit 6. CL = 18 -		
	Bit 7. Reserved.		
16	Minimum CAS Latency Time (tAAmin).	13.125ns	0x69
17	Minimum Write Recovery Time (tWRmin).	15.0ns	0x78
18	Minimum RAS# to CAS# Delay Time (tRCDmin).	13.125ns	0x69
19	Minimum Row Active to Row Active Delay Time (tRRDmin).	6.0ns	0x30
20	Minimum Row Precharge Delay Time (tRPmin).	13.125ns	0x69
21	Upper Nibbles for tRAS and tRC.		0x11
	Bit 3 ~ Bit 0. tRAS Most Significant Nibble -	1	
	Bit 7 ~ Bit 4. tRC Most Significant Nibble -	1	
22	Minimum Active to Precharge Delay Time (tRASmin), Least Significant Byte.	36.0ns	0x20
23	Minimum Active to Active/Refresh Delay Time (tRCmin), Least Significant Byte.	49.125ns	0x89
24	Minimum Refresh Recovery Delay Time (tRFCmin), Least Significant Byte.	160.0ns	0x00
25	Minimum Refresh Recovery Delay Time (tRFCmin), Most Significant Byte.	160.0ns	0x05
26	Minimum Internal Write to Read Command Delay Time (tWTRmin).	7.5ns	0x3C
27	Minimum Internal Read to Precharge Command Delay Time (tRTPmin).	7.5ns	0x3C
28	Upper Nibble for tFAW.		0x00
	Bit 3 ~ Bit 0. tFAW Most Significant Nibble -	0	
	Bit 7 ~ Bit 4. Reserved -	0	
29	Minimum Four Activate Window Delay Time (tFAWmin), Least Significant Byte.	30.0ns	0xF0
30	SDRAM Optional Features.		0x03
	Bit 0. RZQ / 6 -	X	
	Bit 1. RZQ / 7 -	X	
	Bit 6 ~ Bit 2. Reserved -		
	Bit 7. DLL-Off Mode Support		
31	SDRAM Drivers Supported.		0x01
	Extended Temperature Range -	X	
	Extended Temperature Refresh Rate -		
	Auto Self Refresh (ASR) -		
	On-die Thermal Sensor (ODTS) Readout -		
	Reserved -		
	Reserved -		
	Reserved -		
	Reserved -	X	
32	Reserved	€	0x80

33-59	Reserved	UNUSED	0x00
60	Module Nominal Height.		0x0F
	Bit 4 ~ Bit 0. Module Nominal Height max, in mm -	29<h<=30	
	Bit 7 ~ Bit5. Reserved -	0	
61	Module Maximum Thickness.		0x11
	Bit 3 ~ Bit 0. Front, in mm (baseline thickness = 1 mm) -	1<th<=2	
	Bit 7 ~ Bit 4. Back, in mm (baseline thickness = 1 mm) -	1<th<=2	
62	Reference Raw Card Used.		0x01
	Bit 4 ~ Bit 0. Reference Raw Card -	R/C B	
	Bit 6, Bit 5. Reference Raw Card Revision -	Rev.0	
	Bit 7. Reserved -	0	
63	Address Mapping from Edge Connector to DRAM.		0x05
	Bit 0. Rank 1 Mapping (Registered DIMM - Reserved) -		
	Bit 7 ~ Bit 1. Reserved -		
64-66	Module-Specific Section	UNUSED	0x00
67	Register Revision Number		FF
68, 69	Module-Specific Section	UNUSED	
70	Module-Specific Section	P	0x50
71-112	Module-Specific Section	UNUSED	0x00
113	Module-Specific Section.	UNUSED	0x00
114-116	Module-Specific Section	UNUSED	0x00
117	Module Manufacturer ID Code, Least Significant Byte		0x01
118	Module Manufacturer ID Code, Most Significant Byte		0x91
119	Module Manufacturing Location	UNUSED	0x00
120,121	Module Manufacturing Date		0x20
122-125	Module Serial Number	#	0x23
126	Cyclical Redundancy Code (CRC).	CRC	0x86
127	Cyclical Redundancy Code (CRC).	CRC	0x2E
128-131	Module Part Number		0x20
132	Module Part Number	D	0x44
133	Module Part Number	A	0x41
134	Module Part Number	T	0x54
135	Module Part Number	A	0x41
136	Module Part Number	R	0x52
137	Module Part Number	A	0x41
138	Module Part Number	M	0x4D
139	Module Part Number		0x20
140	Module Part Number	6	0x36
141	Module Part Number	4	0x34
142	Module Part Number	3	0x33
143	Module Part Number	2	0x32
144	Module Part Number	8	0x38
145	Module Part Number		0x20
146,147	Module Revision Code		0x20
148	DRAM Manufacturer ID Code, Least Significant Byte	UNUSED	0x00

149	DRAM Manufacturer ID Code, Most Significant Byte	UNUSED	0x00
150-175	Manufacturer's Specific Data	UNUSED	0x00
176-255	Open for customer use	UNUSED	0x00

Bytes: 122-125 change per DIMM.

DATARAM CORPORATION, USA Corporate Headquarters, P.O. Box 7528, Princeton, NJ 08543-7528;
Voice: 609-799-0071, Fax: 609-799-6734; www.dataram.com

All rights reserved.

The information contained in this document has been carefully checked and is believed to be reliable. However, Dataram assumes no responsibility for inaccuracies.

The information contained in this document does not convey any license under the copyrights, patent rights or trademarks claimed and owned by Dataram.

No part of this publication may be copied or reproduced in any form or by any means, or transferred to any third party without prior written consent of Dataram.